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ABSTRACT

The reading level of selected marine science texts was ascertained using Fry's Readability Formula (Maginnis, 1969). Attached, with an annotated list of twenty texts, is a table that lists the reading levels for each text. (CS)

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THE READABILITY OF SELECTED MARINE SCIENCE TEXTS BY GRADE LEVEL

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Introduction

Hey, I can't understand this stuff! A cry often heard from a student trying to comprehend a text not intended for his reading level. Individualization has become an important concept in modern education but students must have suitable and understandable material. Teacher's judgement is certainly important in choosing the right text and supplementary material, however, it is helpful to have an additional assessment procedure to use. Readability formulas fill this need to determine the ease by which printed material may be understood.

Objective

The primary purpose of the study was to ascertain the reading level of selected marine science texts. These texts were being considered for inclusion in a Marine Science Education Module which was being developed as a segment of a secondary science methods course at the University of Maine at Orono.

A secondary purpose of the study was to evaluate the potential of these texts for use in a precollege science program.

Procedure

Fry's Readability Formula, Maginnis (1969), was the instrument used to ascertain the texts readability level. Fry's formula, as indicated in a study by Guidry & Knight (1976), was found to have a relatively high rate of reliability for obtaining accurate reading grade levels of readability. Another positive attribute is that the formula may be used to determine

the readability of material from the preprimer through the college level.

The procedure of Fry's formula requires that a 100+ word sample be taken in which the number of syllables and sentences are counted in order to determine a grade equivalent for the passage. This grade equivalent is arrived at by plotting the number of syllables and sentences per 100 words on a graph. In this study the formula was used on the first paragraph of every fiftieth page beginning with page five of each text. When a figure, chart, or photograph appeared on a sample page the next usable page was grade leveled. If in plotting the information on Fry's graph the grade arrived at boarded two levels, the lower level was accepted as the level of that passage.

Results

The name of each text, the author, publisher, and the copyright date are listed in Table I. Column two of this table gives a brief description of each text. The results of the data were tabulated in Table II. The first column of the table gives the number of the text as listed in Table I. The following columns list the grade levels (13+ refering to college level) of readability found on pages five through 305 and the final column gives the average readability level.

Five of the texts, A Biology of Higher Invertebrates, Biology of Suspension Feeding, Oceanography, A Biology of Lower Invertebrates, and The Biology of Estuarine Animals,

TABLE I

TEXT TITLES, AUTHORS, AND DESCRIPTIONS

	Text	Descriptions
1.	A Biology of Higher Invertebrates, W.D. Russell-Hunter. Macmillian Co. N.Y. 1969	Current concepts in Biology series. Contains 61 figures ranging from B&W simple line drawings to actual photographs.
2.	A Biology of Lower Invertebrates, W.D. Russell-Hunter. Macmillian Co. N.Y. 1968	Arrangement same as above.
3.	An Introduction to Navigation & Nautical Astronomy, Shute, Shirk, Porter, Hemenway. Macmillian Co., N.Y. 1944	Designed to provide a complete course in navigation without the need for supplementary materials.
4.	Biology of Suspension Feeding, C. Barker Jorgencen, Pergamon Press. Oxford, London, Paris, Edinburgh, Frankfurt. N.Y. 1966	Desired for advanced students & research workers in zoology and related areas of study.
5.	Elements of Marine Ecology, R.V. Tait. R.J. Acford Ltd. Industrial Estate, Chiclvester, Sussex, Great Britian. 1968	Compiled as an aid for zoology students at the start of a course on marine biology.
6.	Life and Death of the Salt Marsh, John & Mildred Teal. An Atlantic Monthly Press Book Little, Brown, & Co., Boston, Toronto. 1969	Shows the development of a marsh, kinds of life in them how they contribute to man, and how man is destroying them.
7.	Mollusks, Paul Bartsch. Dover Publishing, Inc., N.Y., N.Y. 10014. 1968	Designed for students of natural history, includes invertebrates, bivalves, tooth-shell, snails & their allies, the octopuses, squids & kin.
8.	Nonvascular Plants: Form and Function, William T. Doyle. Wadsworth Pub. Co., Inc. Belmont, Calif. 1965	Fundamentals of Botany Series, contains line drawings and photographs.

TABLE I

TEXT TITLES, AUTHORS, AND DESCRIPTIONS

(continued)

	Text	Descriptions
9.	Oceanography. Herome Williams. Little Brown & Co., Inc. Canada, U.S. 1962	Broad coverage includes material on marine biology, marine geology, and marine chemistry.
10.	Riches of the Sea, Norman Carlisle. Sterling Pub. Co., Inc., N.Y., N.Y. 10016 1967	Oceanography text concerned with the sea as a crucial natural resourse. Many photographs.
11.	Starfish and their Relations. Ailsa M. Clark. Trustees of the British Museum (Natural History) London. 1968	Designed for students majoring in the study of the marine sciences. Contains 16 plates. 31 figures (simple line & shaded).
12.	The Atlantic Shore, John Hay & Peter Farb. Harper & Row Pub. Inc. N.Y., N.Y. 10016 1966	Human and natural history from Long Island to Labrador. Includes Appendix of Natural Areas of the North Atlantic Coast.
13.	The Biology of Estuarine Animals, J. Green. Great Britain, Billing & Sons Limited	Designed to give undergraduates an account of the biology of animals living in estuaries.
14.	The Edge of the Sea, Rachael Carson. Signet Science Library Books N.Y., N.Y. 10019 1955	Combines vivid prose with scientific accuracy to provide a story of creatures living at the edge of the sea.
15.	The Explorers of the Sea, Muriel Guberlet. The Ronald Press Co., N.Y. 1964	Famous oceanographic expitions includes accounts of surface & sub-surface polar expeditions man and the ocean's deepest valley, and the penetration of the earth's interior.
16.	The Life of the Marsh, William A. Niering. McGraw-Hill, Inc. 1966	Shows an ecological treatment of the wetlands of North America, and the interrelationships between plants and animals of them. This text contains many color photographs also b & w and line drawings.

TABLE I

TEXT TITLES, AUTHORS, AND DESCRIPTIONS

(continued)

	Text	Descriptions
17.	The Sea Around Us, Rachael Carson. Signet Science Library Books, N.Y., N.Y. 10019 1961	A story of the great strides made in Oceanography and important findings. Includes several photographs.
18.	The Sea Shore, C.M. Yonge. Athenum, N.Y. 1963	An introduction to general knowledge of the animal and plant kingdom and an ecological study.
19.	This Great and Wide Sea, R.E. Coher. The Science Library Harper & How Pub., N.Y., Evenston, & London. 1962	Introduction to Marine Biology and Oceanography. Includes history & geography, chemistry & physics and life in the sea.
20.	Under the Sea Wind, Rachael Carson. Signet Science Library Books, N.Y., N.Y. 10019 1941	A naturalist's picture of ocean life. Also includes a glossary of many sea creatures.

are written on a college level and maintain this level throughout the text. Riches of the Sea, This Great and Wide Sea, and Starfish and Their Relations have an average level of twelth grade but include passages whose ranges are in the ninth and tenth grade areas. Although The Life of The Marsh has an average readability level of grade eight, the text varies from the seventh to eleventh grades. The final passage of this text is at the seventh grade level.

TABLE II

READABILITY LEVELS FOR EACH SECTION OF THE SELECTED TEXTS

Text Number	Page Numbers 5	55	105	155	205	255	305	Average
1	13+	13+	12	13+	13+			13+
2	13+	13+	13+	11				13+
3	10	10	10	9	10	12	9	10
4	13+	13+	13+	13+	13+			13+
5	11	13+	13+	11	8			11
6	7	7	8	8	9	8		8
7	13+	9	10					11
8	10	10	13+					11
9		12	13+	13+	13+			13+
10	13+	9	11	12	13+			12
11	13+	10	12					12
12	11	13+	9	11	9			11
13	12	12	13+	12	13+	13+	13+	13+
14		9	9	11	8			9
15	10	12	11	10	11			11
16		7	11	7				8
17		11	9	13+				11
18		11	11	11	11	9	13+	11
19	9	13+	10	13+	13+	13+		12
20		10	8					9

The Edge of the Sea also fluctuates from below its' average readability level to a considerably higher level. The Explorers of the Sea has a lower level of grade ten and high of grade twelve, resulting in an average level of eleven. Additionally, Nonvascular Plants: Form & Function has an eleventh grade average but jumps from a tenth grade level at the beginning and center of the text to a college level at the end of the text.

An Introduction to Navigation & Nautical Astronomy has an average of tenth grade readability. There is however a dip to the grade nine level in the center of the text. This publication also includes a passage in the latter quarter which reached the twelth grade level.

Conclusion

The results of this study show that reading levels, of the selected marine science texts, fluctuate markedly. Some texts exhabited a fluctation in reading level of as much as four grades. The results of the study showed additionally, that some of the inclusive texts are appropiate for inclusion in a precollege marine science course. Others of these texts are wholly beyond the ability levels of the majority of precollege marine science students.

An astutite instructor may pick and choose. Many of the texts included here are suitable in part only for those who have reached the college reading level, while in part they are suitable for high school level readers. Careful observation will allow the inclusion of

instructionally important portions of these texts at levels below their average.

References

Guidry, Loyd J. and Knight Frances D. (1976) "Comparative Readability: Four Formules and Newberry Books," Journal of Reading, Vol. 19, No. 7

Maginnis, George H. (1969) "The Readability Graph and Informal Reading Inventories," Reading Teacher, 22, 518